Birla Institute of Technology & Science, Pilani
Work-Integrated Learning Programmes Division
First Semester 2019-2020
Mid-Semester Test (EC-2 Regular)

Course No.	: MBA ZC417
Course Title	: QUANTITATIVE METHODS
Nature of Exam	: Closed Book
Weightage	: 30%
Duration	: 2 Hours
Date of Exam	: Saturday, 21/09/2019 (AN)

No. of Pages = 4
No. of Questions = 7

Note:
1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1. The police conducted surveys at randomly selected sites in the city to collect data on the usage of helmets by motorcyclists. The following table presents the data.

	Wearing Helmet?	
Region	Yes	No
North	96	62
East	86	43
South	92	49
West	76	16

Suppose a motorcyclist is selected at random.

A. Estimate the probability that the motor-cyclist is wearing a helmet
B. What is the probability the motor-cyclist is wearing a helmet given he is from the East.
C. What is the probability the motor-cyclist is from the East given he is wearing a helmet.

[3 * 1 = 3]

Q.2. A sample of 5 days of sales (X) was collected. This is shown in the table below.

	Sales (X)	**X – Mean**	**$(X - Mean)^2$**
	94		
	100		
	85		
	94		
	92		
Sum			

(a) Complete the table in your answer booklet. Then compute a point estimate of σ^2.
(b) The shopkeeper considers a day successful when the sales is greater than 90. Compute a point estimate of the percentage of successful days. [3 + 1 = 4]

Q.3. A radar unit was placed at a strategic point on the Outer Ring Road to measure speeds of the automobiles. The police observed that the speeds are normally distributed with a mean of 90 kmph and a standard deviation of 10 kmph.

(a) What is the probability that a car picked at random is travelling at more than 100 kmph?
(b) Suppose the police is tasked with booking the top 2.5% of speeding cars. At what speed should the radar unit alert the police? [2 + 3 = 5]

Q.4. The company has seen a number of petty thefts in its factory. It has rented a lie detector to assess the truthfulness of its factory staff. If a person is telling the truth, the probability that the lie detector finds the person is lying is 0.2. One department has 5 employees and **all 5 employees are honest**. The lie detector is applied to them and, of course, all 12 answer truthfully.

A. What is the probability that the lie detector says at least 1 employee is lying?

B. What is the mean number among 5 truthful persons who will be classified as deceptive?

[3 + 2 = 5]

Q.5. Patients arrive at the hospital at the average rate of 6 per hour on weekend evenings. What is the probability of 4 arrivals in 30 minutes on a weekend evening? [3]

Q.6. The franchise focuses on lower-end music systems and has 260 retail outlets across the country. The firm is evaluating a potential location for a new outlet, based in part, on the mean annual income of the individuals in the marketing area of the new location. A random sample of 36 individuals was taken, and the average income was Rs.4 lakhs. The sample standard deviation was Rs.0.42 lakh. Compute a 95% confidence interval estimate for the population mean annual income.
Your answer should attempt to follow the logical sequence done in class. [5]

Q.7. The city police claimed that at least 50% of road accidents occurring late night were caused by drunk driving. And, therefore, the police wanted bars to close by 10 PM. The bar owners in the city collected that accident reports over the last one year. They found that of the 120 road accidents 42 were caused by drunk driving. Use these data to test the police claim at 5% significance level. Use the p-value approach.
Your answer should attempt to follow the logical sequence done in class. [5]

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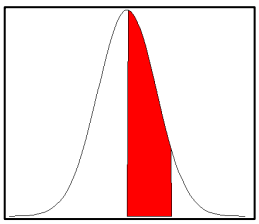
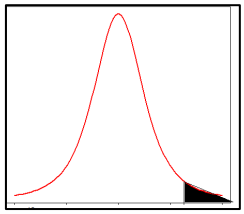


The NORMAL TABLES

Gives the area between Z = 0 and the specified Z-value

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.00	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.10	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.20	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.30	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.40	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.50	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.60	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.70	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.80	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.90	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.00	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.10	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.20	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.30	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.40	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.50	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.60	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.70	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.80	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.90	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.00	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.10	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.20	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.30	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.40	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.50	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.60	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.70	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.80	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.90	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.00	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990



The t Distribution

Area in Upper Tail

DoF	0.2	0.1	0.05	0.025	0.01	0.005
1	1.3764	3.0777	6.3138	12.7062	31.8205	63.6567
2	1.0607	1.8856	2.9200	4.3027	6.9646	9.9248
6	0.9057	1.4398	1.9432	2.4469	3.1427	3.7074
7	0.8960	1.4149	1.8946	2.3646	2.9980	3.4995
8	0.8889	1.3968	1.8595	2.3060	2.8965	3.3554
9	0.8834	1.3830	1.8331	2.2622	2.8214	3.2498
30	0.8538	1.3104	1.6973	2.0423	2.4573	2.7500
31	0.8534	1.3095	1.6955	2.0395	2.4528	2.7440
32	0.8530	1.3086	1.6939	2.0369	2.4487	2.7385
33	0.8526	1.3077	1.6924	2.0345	2.4448	2.7333
34	0.8523	1.3070	1.6909	2.0322	2.4411	2.7284
35	0.8520	1.3062	1.6896	2.0301	2.4377	2.7238
36	0.8517	1.3055	1.6883	2.0281	2.4345	2.7195
37	0.8514	1.3049	1.6871	2.0262	2.4314	2.7154
38	0.8512	1.3042	1.6860	2.0244	2.4286	2.7116
39	0.8509	1.3036	1.6849	2.0227	2.4258	2.7079
40	0.8507	1.3031	1.6839	2.0211	2.4233	2.7045
76	0.8464	1.2928	1.6652	1.9917	2.3764	2.6421
77	0.8463	1.2926	1.6649	1.9913	2.3758	2.6412
78	0.8463	1.2925	1.6646	1.9908	2.3751	2.6403
79	0.8462	1.2924	1.6644	1.9905	2.3745	2.6395
80	0.8461	1.2922	1.6641	1.9901	2.3739	2.6387
81	0.8461	1.2921	1.6639	1.9897	2.3733	2.6379
82	0.8460	1.2920	1.6636	1.9893	2.3727	2.6371
83	0.8460	1.2918	1.6634	1.9890	2.3721	2.6364
84	0.8459	1.2917	1.6632	1.9886	2.3716	2.6356
85	0.8459	1.2916	1.6630	1.9883	2.3710	2.6349
86	0.8458	1.2915	1.6628	1.9879	2.3705	2.6342
87	0.8458	1.2914	1.6626	1.9876	2.3700	2.6335
88	0.8457	1.2912	1.6624	1.9873	2.3695	2.6329
100	0.8452	1.2901	1.6602	1.9840	2.3642	2.6259
∞	0.8416	1.2816	1.6449	1.9600	2.3263	2.5758